

It starts out as a solid and becomes a paste. It could be compared to Double Bubble Gum which is hard until it is chewed wherein it assumes the soft, chewable and plastic properties associated with gum. There is no dispute it is called “gum” in its hard state.

This exact point was never specifically a point of objection or rejection. In the present invention the solid core polish is a solid and becomes a paste on the surface of the tooth when it is used. A spring dispenses the solid core pellet from the internal of the prophy cup during the rotation of the prophy cup as the open end of the prophy cup of the prophy cup is pushed against the surface of the tooth. The solid polish only becomes a paste on the surface of the tooth when it mixes with water on the surface of the tooth (the patient had been asked to rinse immediately prior to the prophy).

This is explained in the specifications as follows:

Page 1, col. 2, lines 5-7: “The patient is asked to rinse prior to the prophy which supplies moisture to the tooth surface and the rotation of the prophy cup dispenses the prophy paste.”

In Dentistry the term “Prophy Paste” is a generic term and includes a variety of substances used with a prophy cup to polish or clean teeth. The original prophy paste was pumice mixed with water. Water has two functions. The first is to bind the powdery pumice and the second is to cool the tooth during the polishing process [0002]. The prophy cup was dipped in the prophy paste and carried to the tooth where the prophy cup containing the water- pumice mixture was rotated on the tooth [0001]. There is no specific requirement that the prophy paste flow.

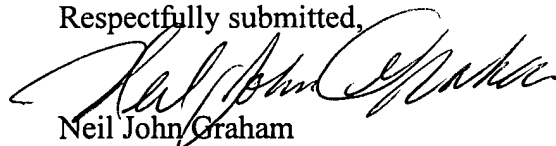
The prior art that involves a piggybacked pouch, or reservoir, does require the flow to get the prophy paste into the prophy cup. The reservoir technique never became popular. Examining current companies that distribute modern tooth prophy materials the following conclusions may be made: there is still no requirement that the prophy paste flow and the dominant technique for polishing teeth involves repeatedly dipping the prophy cup into the prophy paste and carrying it to the tooth [0001]. The polish material varies and the liquid varies.

Figs. 1-5 also reveal the fact the polish within the prophy cup is solid. In Fig.5 note the cylindrical solid core 11 is within the prophy cup 1. The solid core 11 has a cylindrical form contains annular grooves 18 (a paste could not have a cylindrical form and circumferential grooves) which engage the retaining lip 15 of the prophy cup 1 [0003]. The opposite end of the solid core 11 contains a spring 23, which is pushing the solid core towards the open end of the cup 1 [0003]. The annular groove 18 of the solid core engages the lip 15 of the prophy cup 1 resisting the push of the spring 23 [0003]. Additionally if the solid core 11 was a paste, the spring would push the paste immediately out of the open end of the prophy cup 1. The solid core 11 must be solid in order to be contained within the prophy cup 1 under the pressure of the spring 23. As the prophy cup 1 is pushed against the tooth the open end of the cup opens releasing the lip from the engagement with the groove and the solid core is pressed against the tooth surface which is wet from rinsing [0003] (discussed above). The cup 1 is rotating at the same time, which mixes the outer end of the solid core 11 with the surface water, which forms the prophy paste. The paste form only exists on the surface of the tooth.

In conclusion, the solid core prophy paste is a solid within the prophy cup which allows the prophy cup to retain it under spring pressure and is in paste form when it meets the water on the surface of the tooth; hence the name solid core prophy paste. The fact that the polish starts as a solid does not preclude the use of the term prophy paste in light of the fact the polish ends up as a paste on the surface of the tooth and additionally Prophy Paste is a generic term, which includes any polish for polishing teeth. Incidentally, the polish need never become paste-like. If the tooth can be kept cool during the polishing procedure no liquid is necessary.

My suggestion is to (1) leave solid core prophy paste as is, or (2) change the word paste to polish, or (3) change the word paste to pellet. Pellet has some logic because a pellet is hard and may be cylindrical. I have submitted a version of the 12/01/2005 amendments with the term "paste" changed to "polish" in the specification and claims.

Respectfully submitted,



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**ALL-IN-ONE PROPHY ANGLE**

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## **BACKGROUND OF THE INVENTION**

This invention relates to dental prophylactic (prophy) angle handpieces, prophy cups, and prophy polish for professional cleaning of teeth.

Rotating prophy cups are generally used to carry and apply prophy paste to the teeth. The prophy paste is comprised of an abrasive, a binder, and a liquefying agent which is used to create a flow of the paste. The prophy cup functions by carrying the prophy paste to the surface of the teeth and the cup material polishes all surfaces of the teeth, including subgingival and interproximal surfaces. Typically the prophy cup picks up the paste by dipping the cup in a reservoir of paste. As the cup is rotated by the prophy angle, the prophy paste exits the cavity and is applied to the tooth. The paste acts as both a lubricant and an abrasive.

Due to the centrifugal rotation of the prophy cup the pumice quickly exit exits the cup and splatters throughout the mouth and on the patient and operator, increasing the risk of cross contamination. Prophy cups have been designed in an attempt to slow down the exiting of the prophy paste. The prophy cup must be repeatedly reloaded, which is time-consuming. Prophy handpieces have been designed to deliver continuous supply prophy paste thus eliminating the need to refill the prophy cup, but do not allow the operator to quickly vary the flow of paste as needed and does not eliminate the splatter problem. A prophy handpiece named the Twist <sup>TM</sup> Pat. No. 6,409,507 has been designed to reciprocate 90 degrees rather than to rotate. The Twist <sup>TM</sup> claims to produce faster prophys, and no tearing or cutting of soft tissue and no frictional heat. The Twist <sup>TM</sup> represents a reasonable attempt to control splatter, but the reciprocating motion is not as efficient as the rotary motion at polishing teeth and does not deliver a continuous supply of prophy paste.

## **SUMMARY OF THE INVENTION**

The present intervention is directed towards a solid core prophy polish to be used in cleaning teeth. Also included are a dental prophy angle and a prophy cup. The prophy cup is comprised of a longitudinal cylindrical body with an interior and exterior, a rear and front end, the rear end contains a shaft which connects to the prophy angle. The prophy cup front end has a circular polishing edge. Adjacent to the polishing edge, towards the body interior, is a circular retaining edge. Contained within the interior of the body of the prophy cup is the longitudinal solid core prophy polish with circumferential circular rings, which are at right angles to the prophy polish's long axis. The solid core prophy polish has a front end which engages the tooth and a second end with an end plate which engages a disc or piston which is

fitted to the interior of the body of the prophy cup and is positioned vertical its long axis. Positioned between the body second end and the piston is a longitudinal spring which supplies a continuous dispensing pressure against the solid core polish. The solid core prophy polish is retained within the interior of the prophy cup by the circular retaining edge which engages the an annular groove of the solid prophy polish. At rest the dispensing force of the spring is countered by the holding force of the retaining edge and the solid core prophy polish is held in place. As the prophy cup is pressed against the tooth surface the annular retaining edge increases in circumference, which releases the retaining edge from the prophy polish's circular ring, which allows the spring to push the polish against the tooth surface, which dispenses the polish during the prophylaxis of the patients teeth. The patient is asked to rinse prior to the prophy which supplies moisture to the tooth surface and rotation of the prophy cup dispenses the prophy polish. The harder the prophy cup is pushed against the tooth surface the quicker the polish is dispatched. The pressure of the tooth against the solid polish counteracts the force of the spring and retains the polish within the prophy cup. Pressure against the tooth dispenses a consistent amount of polish on the tooth. There is no splatter of the prophy polish and the prophy angle may be kept in the mouth from start to finish continuously. The result is minimal, if any, splatter, which reduces cross-contamination and results in a reduction of operating time.

### **BRIEF DESCRIPTION OF THE DRAWINGS**

**FIG. 1** is a side view of the prophy cup and angle mounted to a dental handpiece;

**FIG. 2** is a x-sectional view of the prophy cup containing the prophy polish;

**FIG. 3** is the same as **FIG.2** with the prophy cup pushed against the tooth surface, releasing the prophy polish;

**FIG. 4** is a x-sectional view of a preferred embodiment off the all-in-one prophy angle;

**FIG. 5** is a x-sectional view of a preferred embodiment off the all-in-one prophy angle; and

**FIG. 6** is a x-sectional view of a preferred embodiment off the all-in-one prophy angle.

### **DETAILED DESCRIPTION OF THE INVENTION**

Referring to **FIG.1** a prophy cup **1** is shown attached to a prophy angle dental handpiece **2** which is then attached to a dental handpiece **3**. The dental handpiece **3** provides rotating power to the prophy angle **2** which in turn rotates the prophy cup **1**. The prophy cup is used in combination with a prophy polish in cleaning the teeth. In **FIG. 1** a preferred embodiment of the invention is shown comprising a prophy cup **1** containing a solid core prophy polish **11**.

The prophy cup **1** of the present invention is shown in **FIGS. 1-4**. The cup **1** is made of a pliable elastomeric material having a durometer hardness of about 42 to about 70. Preferably the cup **1** is made of a natural rubber or polyisoprene containing a small amount of abrasive. The preferred abrasive in the prophy cup **1** is medium and fine grade pumice. Other abrasives can be used such as hard minerals (Mohs hardness 5 to 9) and softer minerals, such as phosphates (Mohs hardness below 5).

Depicted in **FIGS. 1-3** the dental prophy cup **1** is comprised of a cylindrical body **12** with a longitudinal axis having a rear mounting portion **13** and a front polishing portion **14**. The rear mounting portion **13** has a recess, or in the alternative, a shaft **17** for attachment to a conventional prophy handpiece **2** for rotation about the long axis of the body **12**. The front polishing portion **14** includes a front surface **15** which defines a skirt which slopes outwardly towards the front, the diameter of the bottom skirt being greater than the top of the skirt. The top of the skirt defines an annular retaining edge **15**, which retains the solid core prophy polish **12**. The body **12** of the prophy cup **1** is defined by a wall **16** with an inside and an outside. The inside wall is smooth and encloses the solid core prophy polish **11** which has the same axial longitudinal direction as the prophy cup body **12** of the prophy cup **1** and is positioned at the front edge of the inside of the body **12** of the prophy cup **1**. Located within the inside of the body of the mounting portion **13** is a force means which applies pressure on the solid core polish **11** which dispenses the polish towards the surface of the tooth **8**. As the front polish in the front polishing portion **14** of the prophy cup **1** is pressed against the tooth surface **8** the front polishing portion **14** stretches into a larger diameter which also stretches the retaining side **15** into a larger circumferential diameter which releases the retaining side **15** from the corresponding solid core groove **18**. The result is the solid core polish **11** is pressed against the tooth surface by the rear force means **21** and the rotation of the prophy cup **1** releases the prophy polish **11** at a uniform rate. When no loads are placed against the tooth the solid core prophy-polish **11** is retained within the prophy cup **1**.

In a preferred embodiment in **FIGS. 2 and 3** the pressure produced against the solid core prophy polish **11** is produced by an internal spring **21** at the rear end of the prophy cup **1**. The spring pressure is applied to a circular piston which in turn transmits the pressure to the solid core prophy polish **11**.

In **FIG. 4** is another preferred embodiment. The shaft **31** is hollow with a 2-4 mm. internal open diameter. The piston is located adjacent to the rear end. The front end of the shaft **17** is a bulbous ball **38** which the prophy cup **1** is fitted and attached to. The prophy cup **1** and the solid core prophy polish **11** may be replaced.

In **FIG. 5** is another embodiment wherein the means to extrude the solid core prophy polish **11** is liquid or air delivered by a rotational paddle **28** within the prophy angle which delivers the force to the piston which in turn moves the solid core polish **11**.

In **FIG. 6** is another preferred embodiment wherein the prophy handpiece **2** has an internal cavity which contains a prophy cartridge **38** comprised of metal or plastic which internally contains the wall **16** of the prophy cup **1**. The wall of the prophy cup **1** fits the internal wall **16** of the prophy cartridge **38**. The wall of the prophy cartridge **38** contains an internal screw **31** which fits into a female screw hole **32** of the prophy cup **1**. The prophy cup **1** has an internally contained spring **23**, which dispenses the solid core prophy polish **11** towards the tooth surface **6**. In this embodiment the prophy cartridge **38** is mounted within the prophy angle **2** with bearings **33** and a drive mechanism. The drive mechanism is comprised of an annular gear **36** attached to the outer circumference of the prophy cartridge **38** which engages with the prophy angle **2** drive gear **35**. The prophy angle drive gear **35** is contained and attached within the hollow interior cup-shaped fitting **39** which forms the end of the driveshaft **34** adjacent to the prophy cartridge **38**. The entire prophy cartridge **38**, containing the prophy cup **1** and solid core prophy polish **11** rotates during cleaning teeth. This embodiment allows for the largest amount of solid core prophy polish **11** and the replaceability of the prophy cup **1** containing the solid core prophy polish **11** by unscrewing the prophy cup **1** and screwing a new cup **1** on. This allows for the use of a second prophy cup **1** with polish **11** and also allows for a sterilizable re-usable prophy angle **2**.

The solid core prophy polish **11** is comprised of a dental abrasive from a group consisting of pumice, clay, and diatomaceous earth with curing systems such as sodium silicate ( 3-4 parts )and methyl salicylate ( 0.24- 1.25 parts ). The dental abrasive value (RDA), using the Hefferen method, should be above 200.